

a solution up to 1 GHz, and because cable systems will expand beyond 1 GHz sometime in the next decade, TCI continues to believe that the best way to ensure long-term compatibility between TVs/VCRs and cable systems with respect to tuning capacity is to require the incorporation of modular tuners in TVs and VCRs. As TCI has previously noted, adding modularity to TVs/VCRs would protect consumers from premature obsolescence of their products caused by the unsynchronized technology cycles of the cable and consumer electronics industries.<sup>37</sup>

If modular tuning is not implemented, however, the Commission should at the very least require consumer electronics manufacturers to indicate on the packaging of their TVs/VCRs that the tuning capacity of these products is limited and may not be fully compatible with certain cable systems. If the Commission fails to require such clear consumer notification, it runs the risk of engendering a new level of consumer confusion as cable system capacity expands beyond 1 GHz.<sup>38</sup>

### **3. Decoder Interface Standard**

#### **a. The Commission Should Not Adopt the Current, Antiquated Version of EIA/ANSI 563**

TCI supports the Commission's goal of adopting a Decoder Interface as a mandatory requirement for all new TVs/VCRs that tune cable channels, but it strongly objects to adoption of the current, obsolete version of EIA/ANSI 563 if the revised

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<sup>37</sup> See TCI Reply Comments at 13-18.

<sup>38</sup> See also discussion of TCI's proposed point-of-sale notification requirements at 6, supra.

analog/digital version is not available before the Commission adopts rules in April 1994.<sup>39</sup> The Commission is correct in recognizing the significance of EIA/ANSI 563 as a major contributor to compatibility between cable and consumer electronics. However, although the current version of EIA/ANSI 563 is a powerful tool, it was created at a time when digital cable technology was unknown and cable services were mostly one-way. Thus, the current EIA/ANSI 563 interface is incompatible with digital video compression, interactive multimedia, interactive on-screen channel guides, pay per view with barker channels, and impulse pay-per-view ordering. In short, adoption of the current EIA/ANSI 563 interface could heighten, rather than decrease, the level of consumer confusion and frustration.

**b. The Commission Should Await Completion of the Revised Version of EIA/ANSI 563 And Allow Sufficient Comment on this Revised Version Before Adopting a Decoder Interface Standard**

Cable and consumer electronics industry representatives are now negotiating the details of a revised Decoder Interface to replace EIA/ANSI 563. However, TCI doubts that these negotiations can be completed, ample time given for interested parties to review and submit comments on the revised standard, and for the Cable-Consumer Electronics Compatibility Advisory Group ("C3AG") to implement any necessary modifications prior to the Commission's April 1994 deadline. The brief comment period envisioned by the Commission<sup>40</sup> is simply insufficient to satisfy

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<sup>39</sup> See Notice at ¶ 20.

<sup>40</sup> Id.

its reasoned decisionmaking obligations under the APA. Rather, the Commission should invoke the substantial discretion accorded it by Section 17<sup>41</sup> and take adequate time before adopting a more robust Decoder Interface standard. The work underway to upgrade EIA/ANSI 563 to a hybrid analog/digital interface will build on the current version's firm foundation and yield results which better serve the consumer. Not only will the upgraded version be more capable, but it will also be more cost effective and provide substantial flexibility for accommodating current and future cable technologies and services. As such, the upgraded EIA/ANSI 563 interface will greatly enhance the compatibility between cable systems and consumer electronics equipment.

**c. Requiring Cable Systems to Provide All Video Services in a Form Compatible with the Decoder Interface Will Undermine Congress' Goal of Promoting Innovation in Cable Technologies and Services**

The Notice proposes to require cable systems to "provide service in a form that is compatible with the Decoder Interface and component descrambler/decoder equipment used with that connector where 'in the clear' signal delivery methods are not used."<sup>42</sup> This prohibition against delivering new cable services except through the Decoder Interface, however, could stifle the development of innovative technologies and services, contrary to Congressional intent. For the reasons described below, the Commission should require cable operators to deliver through the

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<sup>41</sup> See discussion at 16 and n. 30, supra.

<sup>42</sup> Notice at ¶ 29.

Decoder Interface connector only those cable services existing at the time a particular version of EIA/ANSI 563 is implemented. In order to avoid inadvertently denying new technologies and services to consumers, a cable operator which develops a new video service after the adoption of a particular version of the Decoder Interface standard that is incompatible with that standard should be permitted to deliver this new video service to its subscribers despite its inability to do so through the Decoder Interface connector.

As discussed in the previous section, the current version of EIA/ANSI 563 is incompatible with numerous emerging cable technologies in which billions of dollars have already been invested and which are scheduled for deployment beginning in 1994. Moreover, while every effort is being made by the C3AG to allow the revised EIA/ANSI 563 to accommodate future video services, there is no way to guarantee compatibility with all such services. New cable technologies and services will eventually develop that will be incompatible with this revised standard, as well.

These incompatibilities with the Decoder Interface standard will arise because the technology cycles of the cable and consumer electronics industries are fundamentally unsynchronized. While consumer electronics devices -- especially TVs -- have life spans upwards of 15 years, cable operators expand system capacity and implement new technologies/services much more frequently. Consequently, despite the ability of the Decoder Interface to ameliorate compatibility problems, due to this technological

disjunction between the two industries, there will always be a need for supplementary equipment to deliver new cable services and to implement new technologies that are incompatible with a particular version of the Decoder Interface standard.<sup>43</sup>

Seen in this light, the proposed prohibition in ¶ 29 of the Notice, in effect, imposes a moratorium on emerging cable technologies and services in order to prevent the two industries from becoming unsynchronized. Of course, the imposition of a technological moratorium on emerging cable services and technologies is beyond the scope of the Commission's authority in that it would achieve compatibility at the expense of stifling technological innovation in the cable industry, reducing program diversity, and diminishing consumer choice in direct contravention of overriding congressional, Commission, and executive branch policy objectives. Section 7 of the Communications Act of 1934, as amended, provides: "It shall be the policy of the United States to encourage the provision of new technologies and services to the public."<sup>44</sup> Moreover, among the primary policy objectives of the 1992 Cable Act is the congressional desire to "ensure that cable operators continue to expand, where economically justified, their capacity and the programs offered over their cable systems."<sup>45</sup>

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<sup>43</sup> See TCI Comments at 1-2; Continental Cablevision Comments at 28; Time Warner Comments at 56-57.

<sup>44</sup> 47 U.S.C. § 175.

<sup>45</sup> See 1992 Cable Act §§ 2(b)(1)-(3).

More specifically, any attempt by the Commission to freeze cable technologies and services to ensure compatibility is fundamentally at odds with the statutory provisions of Section 17 which properly anticipate "improvements and changes in cable systems," and which consequently instruct the Commission to review periodically and, if necessary, modify its compatibility regulations to accommodate these improvements and changes.<sup>46</sup> Finally, at a time when the cable industry is poised to contribute significantly to the development of the National Information Infrastructure, the imposition of a moratorium on cable technology is particularly ill-conceived and would delay the deployment of important elements of that infrastructure.

**C. Compatibility Proposals for Cable Systems**

**1. The Notice's Proposal to Prevent Cable Operators From Charging for Component Descramblers/Decoders is Contrary to Commission Precedent and Sound Public Policy**

The Commission's cable rate regulation policies allow cable operators to charge subscribers for set-top boxes based on the actual cost to the operator.<sup>47</sup> In the Notice, however, the Commission proposes a radically different approach that would require cable operators to provide component descramblers/decoders without a separate charge for the equipment or its installation.<sup>48</sup> Rather, under the Commission's approach, installation and rental of this equipment would be included as

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<sup>46</sup> Id. § 17(d).

<sup>47</sup> See 47 C.F.R. § 76.923.

<sup>48</sup> Notice at ¶ 30.

elements of the general cable network whose costs would be recoverable through subscriber revenues from regulated cable services.<sup>49</sup>

TCI strongly opposes this proposed rate regulatory treatment of component descramblers/decoders. The Commission provides no justification for treating component descramblers/decoders differently simply because they are part of an equipment compatibility solution. Disparate treatment is particularly arbitrary here because this equipment performs functions essentially identical to those functions performed by existing descrambling equipment that is currently regulated under the Commission's actual cost standard.<sup>50</sup>

Moreover, the proposed policy is fundamentally at odds with substantial Commission precedent. First, the proposed regulatory treatment contradicts the Commission's longstanding policy of requiring cost-causative customers to incur the costs of equipment they use rather than forcing all subscribers to subsidize this equipment use through higher regulated rates.<sup>51</sup> Second, as the Notice recognizes, the proposed policy contravenes existing Commission rules requiring the unbundling of cable service and equipment rates.<sup>52</sup> Third, the proposed policy, if adopted, strongly encourages cable operators to elect cost-of-

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<sup>49</sup> Id. and n. 27.

<sup>50</sup> See 47 C.F.R. § 76.923.

<sup>51</sup> See, e.g., Tier Buy-Through Order at ¶ 23 (emphasis added). See also discussion at 4, supra.

<sup>52</sup> See Notice at ¶ 30, n. 28, and cites therein.

service regulation rather than benchmark regulation, thereby undermining the Commission's stated preference for the latter.<sup>53</sup>

In addition, a rule which limits the ability of cable operators to recover component descrambler/decoder costs on the same basis as costs for set-top units will reduce operator incentives to promote the EIA/ANSI 563 solution. This would frustrate the deployment of the Decoder Interface standard which will require enthusiastic support and promotion to achieve widespread consumer acceptance. The potential compatibility benefits of EIA/ANSI 563 will thereby remain largely unrealized.

Furthermore, if such limits on cost recovery are adopted, only the simplest version of the Decoder Interface standard will likely emerge, since cable operator incentives to develop new services that utilize EIA/ANSI 563 will be significantly diminished. For example, advanced features or unregulated services which might otherwise have been designed for delivery through EIA/ANSI 563 might be abandoned because they would be too expensive to deploy unless the costs for component descramblers/decoders are recoverable directly from those subscribers who utilize this equipment to purchase these new features or services. Alternatively, subscribers may have to consider renting or purchasing a set-top unit to receive such innovative features or services.

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<sup>53</sup> See, e.g., Cable Rate Regulation, Third Report and Order, MM Docket No. 92-266, FCC 93-519 (released November 24, 1993), at ¶ 2.



A preferable rate recovery approach is the one recommended by C3AG in its supplemental comments. Specifically, the Commission should

(1) require that all cable companies provide the first decoder in each home for connection to Decoder Interface-equipped TVs and VCRs, at no installation charge (in contrast to the installation charge that will ordinarily apply upon installation of a converter/descrambler), (2) require that cable operators charge consumers monthly rentals for set-back decoders and set-top converter/descramblers in proportion to their costs.<sup>54</sup>

The C3AG approach will motivate cable operators to promote and utilize EIA/ANSI 563, while also achieving the Commission's goal of encouraging consumers to acquire new Decoder Interface-equipped TVs and VCRs.<sup>55</sup> As a result, consumer choice will be enhanced and compatibility between cable systems and consumer electronics equipment substantially improved.

**2. The Notice's Attempts to Create Regulatory Incentives Encouraging "In the Clear" Technologies Are Inconsistent with Precedent and Unsupported By This Record**

Various proposals in the Notice are based on the Commission's desire to encourage cable operators to implement "in the clear" conditional access technologies.<sup>56</sup> As a general

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<sup>54</sup> C3AG Supplemental Comments, filed on July 21, 1993, at 11 ("C3AG Supplemental Comments").

<sup>55</sup> See Notice at ¶ 30.

<sup>56</sup> For example, the proposal to disallow charges for component descramblers/decoders is intended to "encourage cable operators to use signal delivery methods that provide all purchased channels simultaneously, in the clear." Notice at ¶ 30. Similarly, the proposal to require all video services to be provided through the Decoder Interface is, in part, an indirect attempt to promote these technologies. See id. at ¶ 29.

matter, TCI strongly objects to the Commission's efforts to accord a competitive advantage to vying technologies. Such governmental handicapping of "in the clear" conditional access techniques is especially inappropriate in this context given the substantial statutory and regulatory precedents and the overwhelming record evidence clearly favoring scrambling as the most effective conditional access technology.

The Notice's expressed preference for "in the clear" technologies is inconsistent with the Commission's recent Tier Buy-Through Order which expressly accorded maximum flexibility to cable operators in their selection of signal access control technologies:

The need to comply with the regulatory policies incorporated in the 1992 Cable Act, including the mandatory signal carriage rules, the rate regulation provisions, and the equipment compatibility requirements, along with the benefits associated with the development of new programming services and potential technological developments, make it highly desirable that systems retain the flexibility to alter their channel configurations and signal access control mechanisms. Thus, we do not intend to mandate the continued use of any particular mode of operation.<sup>57</sup>

Creating regulatory advantages for "in the clear" technologies is similarly at odds with the Commission's longstanding recognition of the benefits of scrambling. For example, after a thorough analysis of scrambling of satellite programming, the Commission correctly concluded that

scrambling has legitimate public interest justifications -- to protect programmers from commercial theft and to allow them to recover

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<sup>57</sup> Tier Buy-Through Order at ¶ 20 (emphasis added).

compensation from all who view their copyrighted product.<sup>58</sup>

In addition, the expressed favoritism in the Notice for "in the clear" techniques ignores Section 17's directive to balance the benefits of compatibility requirements against the costs of imposing such requirements and "the need for cable operators to protect the integrity of signals . . . against theft or . . . unauthorized reception."<sup>59</sup> The record in this proceeding overwhelming demonstrates that the costs -- in terms of decreased security, reduced consumer choice, and increased financial burdens on cable operators -- of "in the clear" technologies outweigh any compatibility benefits these technologies may produce and that the preferable conditional access method is scrambling. As the C3AG described it:

[W]hile [anti-theft measures such as traps, interdiction, broadband descrambling, and other "in-the-clear" approaches] may have their virtues -- and individual cable operators may find them to be appropriate solutions to their particular needs -- none of them is suitable for universal deployment; each has limitations and characteristics that prevent it from reasonably being prescribed as a mandatory solution to compatibility issues. The Advisory Group recognizes that scrambling and encryption are an important part of

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<sup>58</sup> Inquiry into the Scrambling of Satellite Television Signals by Owners of Home Satellite Dish Antennas, 2 FCC Rcd. 1669, at ¶ 220 (1987). See also Inquiry into the Scrambling of Satellite Television Signals by Owners of Home Satellite Dish Antennas, 3 FCC Rcd. 1202, at ¶ 11 (1988) ("By maintaining the incentives to produce programming, scrambling serves the public interest").

<sup>59</sup> 1992 Cable Act § 17(A)(c)(1)(B) (emphasis added).

providing cable services and will remain an essential part of delivering video signals.<sup>60</sup>

The shortcomings of "in the clear" security techniques are amply delineated in the record.<sup>61</sup> While TCI will not repeat these problems here, we emphasize that for the Commission to influence the use of one or more of these techniques in lieu of scrambling would force cable operators to devote substantial sums of money to install inferior security technologies that will be incompatible with digital video compression. These alternative technologies may serve as attractive complements to addressable scrambling in certain situations, but they are in no way adequate substitutes for it. This will be especially true in the emerging, interactive video realm in which customized packaging of programming will require a signal access control method that can secure and distribute many more levels of service and with much greater automation and efficiency than previous systems. In fact, given that many future services will require the security and flexibility accorded by scrambling, the Notice's

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<sup>60</sup> C3AG Supplemental Comments at 7-8. See also "Cable Television: Equipment Compatibility Hearing," attached as Appendix A to Comments of NYC (November, 1991) at 19-20 ("[scrambling] represents state-of-the-art technology in the cable industry. It also represents an important and necessary measure to combat extensive theft of cable service in Manhattan. Other means of fighting theft, including the interdiction technology being tested in several locations around the country, do not yet compare with signal encoding and converter boxes.") (emphasis added).

<sup>61</sup> See, e.g., Cablevision Comments at 6-7; CATA Comments at 7, 12; Continental Cablevision Comments at 20; Greater Media, Inc, et al. Comments at 4-6; Intermedia Comments at 2, 11-13; NCTA Comments at 14-19, 39; NYC Appendix A at 20; Scientific Atlanta Comments at 5; Telecable Comments at 11, Appendix C; Time Warner Comments at 17-24, 32-34.

attempts to create regulatory incentives encouraging "in the clear" techniques will likely backfire: Rather than providing an incentive to develop "in the clear" techniques, these proposals will actually create disincentives to develop these innovative services in the first place, contrary to congressional intent.

### III. STANDARDS ISSUES

#### A. The Imposition of Digital Transmission or Scrambling/Encryption Standards By the Commission Is Contrary to Congressional Intent

The Notice envisions the evaluation and adoption of digital transmission and security standards by the Commission.<sup>62</sup> While the adoption of such standards may ultimately prove to be worthwhile, TCI notes that the imposition of standards by the Commission would be contrary to congressional intent.

Section 9 of the House Amendment, which was adopted by the Conference Committee, directed the Commission to "adopt standards ... that are technologically and economically feasible"<sup>63</sup> and to consider the "costs and benefits of requiring cable operators to adhere to technical standards for scrambling or encryption of video programming ...."<sup>64</sup> However, these explicit directives were deleted by the Conference Committee, thereby indicating Congress' decision to avoid the imposition of such standards by

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<sup>62</sup> Notice at ¶ 34.

<sup>63</sup> H.R. 4850, 102d Cong. 2d Sess. § 9(e) (1992).

<sup>64</sup> Id. § 9(c)(2)(A). See also id. § 9(e) ("In determining the feasibility of such standards, the Commission shall take into account the cost and benefit to cable subscribers and purchasers of television receivers of such standards").

the Commission.<sup>65</sup> Accordingly, the Commission should refrain from imposing digital transmission and security standards on the cable industry.

**B. The Commission Should Not Adopt Digital Transmission or Security Standards Until These Technologies Have Matured**

In addition to its untenability as a legal matter, the premature adoption of digital transmission and security standards should be avoided as a matter of sound public policy. Cable technology is moving at a rapid pace. The recent announcements by cable operators and others to deploy digital video compression and encryption technology within the next two years is but one example of the dynamic changes permeating this industry. In such a rapidly changing technological environment, government standard setting potentially can cause serious disruption. Notably, standardization freezes innovation and the development of new technologies.<sup>66</sup> Vigorous improvement in cable technologies has occurred in the past decade because this industry has not been encumbered by excessive standardization.

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<sup>65</sup> See Sutherland § 48.04, at 325 ("[W]here the language under question was rejected by the legislature and thus not contained in the statute it provides an indication that the legislature did not want the issue considered").

<sup>66</sup> See, e.g., Stanley M. Besen and Garth Saloner, "The Economics of Telecommunications Standards," in Changing the Rules: Technological Change, International Competition, and Regulation in Communications, 177, 194-95 (Robert W. Crandall and Kenneth Flamm eds., 1989) ("The benefits from standardization may make users of a standardized technology reluctant to switch to a new, and perhaps better, technology because of fear that others, bound together by the benefits of compatibility, will not abandon the old standard").

As Besen and Johnson, two prominent experts on technological standards, aptly conclude on this point:

[T]he government should refrain from attempting to mandate or evaluate standards when the technologies themselves are subject to rapid change. A major reason for the Commission's difficulty in establishing the first color television standard was the fact that competing technologies were undergoing rapid change even during the Commission's deliberations. It is only after the technologies have "settled down" that government action is most likely to be fruitful, as illustrated in the TV stereo case.<sup>67</sup>

In short, while standardization may play an important role in future compatibility once digital transmission technologies have matured, it is essential that the standards process not restrain the ability of the cable industry to innovate in the development of new technologies and services.

The desirability of market-driven as opposed to governmentally imposed standards is strongly supported by an economic analysis of technological standards done by two divisions of the FTC and submitted in the FCC's digital audio broadcasting proceeding ("FTC Standards Analysis").<sup>68</sup> The FTC Standards Analysis urged the FCC to leave decisions on technological standards to the market:

The staff believes that the FCC should consider leaving decisions on technological standards to the market.

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<sup>67</sup> Stanley M. Besen and Leland L. Johnson, "Compatibility Standards, Competition, and Innovation in the Broadcasting Industry," Rand Corporation, November 1986, at 135 ("Rand Compatibility Study").

<sup>68</sup> Comments of the Staff of the Bureau of Economics and the San Francisco Regional Office of the Federal Trade Commission, submitted in Establishment and Regulation of Digital Audio Radio Services, Gen. Docket No. 90-357, January 25, 1991 (published at 1991 FCC LEXIS 638).

Our conclusion follows from an analysis of the current literature on standard-setting discussed below. In many instances the market will operate to resolve efficiently the standard-setting issues. Furthermore, in those instances where the market will not achieve the efficient result, there is no reason to believe that a regulatory selection will achieve a preferable outcome. Since it is not possible in this context to identify situations in which markets will operate efficiently from those in which it will fail, this suggests that consumers would likely benefit most from a general FCC policy that leaves the determination of standards to the market.<sup>69</sup>

For the foregoing reasons, TCI strongly urges the Commission to refrain from imposing national digital transmission or security standards on cable providers. No one knows or can adequately predict how this technology will develop; extensive government involvement at this point could inadvertently derail the dramatic progress being made and seriously threaten U.S. competitiveness in the digital video arena.

**C. The Commission Should Rely On Industry Groups To Develop and Recommend Digital Standards**

Finally, any such standards which are eventually adopted should be developed and recommended by industry standards bodies. The Commission has been most successful in recent years when it has relied on industry standards bodies to take the lead in developing standards proposals, subject to review and confirmation by the Commission. As Besen and Johnson have noted in this regard:

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<sup>69</sup> Id. at 32. The FTC's Standards Analysis should be accorded considerable weight in this context given the FTC's responsibility for maintaining competition and safeguarding consumer interests, as well as its expertise on matters concerning the selection of technological standards. See id. at n.7 (identifying those FCC proceedings in which the FTC has submitted comments on the selection of technological standards).



Perhaps the most important rule for government action is that it should depend heavily on industry evaluations and agreements rather than on in-house evaluations. The difficulties of relying on internal evaluations are well illustrated in the color television case, where the FCC initially picked the wrong technology, and in AM stereo, where its recommendation in favor of Magnavox was rejected by industry. In contrast, situations where government action led to adoption of apparently socially beneficial standards, such as in TV stereo, cellular radio, and in the second color television decision, were all based heavily on industry deliberations and recommendations.<sup>70</sup>

Moreover, Commissioner Duggan has recently advocated a greater reliance on such industry advisory committees in these contexts:

To fit changes in technology, I'm convinced that we should rely more heavily on the advisory committee process.... As the technologies we regulate become more complex, I believe the FCC should continue to organize and rely on expert panels ... to gather information and recommend the right choices.<sup>71</sup>

The Commission has pursued an industry consortia approach to the adoption of standards in the PCS context where the level of technological dynamism is similarly high. In its most recent PCS Order, the Commission decided that given the rapid technological change inherent in PCS development, a flexible regulatory approach to PCS technical standards was warranted:

[M]ost parties recognize that PCS is at a nascent stage in its development and that imposition of a rigid technical framework at this time may stifle the introduction of important new technology. We agree, and find that the flexible approach toward PCS

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<sup>70</sup> Rand Compatibility Study at 134-35

<sup>71</sup> "The Consumer Electronics Revolution and the FCC," Remarks of Commissioner Ervin S. Duggan Before the Government Affairs Council of the Electronics Industry Association Consumer Electronics Group, January 9, 1993, at 14.

standards that we are adopting is the most appropriate approach.<sup>72</sup>

Especially given the C3AG's expressed intention to form a subcommittee to pursue digital cable transmission standards,<sup>73</sup> the Commission should pursue a similar strategy in this context.

#### CONCLUSION

Based on the foregoing, TCI respectfully urges the Commission to adopt compatibility solutions consistent with the comments herein.

Respectfully submitted,

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<sup>72</sup> PCS Second Report and Order, Gen. Docket 90-314, FCC 93-451 (released October 23, 1993) at ¶ 137.

<sup>73</sup> C3AG Supplemental Comments at 11-12.

## **APPENDIX A**

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**TELEVISION & RADIO -  
DEALERS**

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ABC TV Video Sound Technology Inc  
8088 Rolling Rd Springfield 455-4200

**A C TV-ANTRONICS**  
TV - VCR - Sales & Service - Free Estimate - We  
Care

800 S Washington St Falls Church 536-4441

Action TV Repair 3108 Lee Hwy Arl 524-7724

**ALCO TV & APPLIANCES**  
5512 Richmond Hwy Alexandria 780-5180

(See Our Ad Next Page)

**ANNANDALE INTERCOMS & SOUND  
SYSTEMS INC** Annandale 256-3435

**ANTRONICS COLOR TV SERVICE**  
800 S Washington St Falls Church 536-4441

(See Our Ad Next Page)

**BELMONT TV & STEREO**  
Maryland City Plaza Shopping Ctr 301 776-5330

Arlington Store 4723 King St Arl 671-8500

Glenmont Store 12500 Layhill Rd  
Wheaton Md 301 942-1330

**BELMONT TV & VIDEO**  
9101 Marshall Av Laurel 301 498-5600

**CIRCUIT CITY**  
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1905 Chain Bridge Rd Tysons Corner 893-6112

5710-14 Columbia Pike Bailey's Cross Roads 845-0130

7039 Old Keene Mill Rd Springfield 912-9105

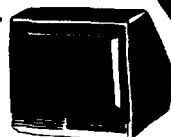
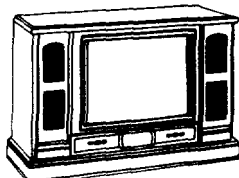
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Authorized Service Magnavox - Also Repair Sony,  
RCA, Panasonic, Hitachi, Sharp  
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**FORT MYER TV & ELECTRONICS REPAIR**  
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(See Our Ad Page 1938)

(Continued Next Page)

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**- MOST MAJOR BRANDS AVAILABLE -**  
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Don't Buy  
That TV or  
Appliance Until  
You Check  
With Us!

**ALCO**  
TV &  
APPLIANCES

"FAMILY OWNED &  
OPERATED FOR  
OVER 40 YEARS"  
- Since Television Began -

Financing Available  
or Approved Credit



**COMPETITIVE PRICES**

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**780-5180**  
8512 RICHMOND HWY

FREDERICKSBURG  
**373-1797**  
400 BUTLER RD

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George Naomi's 2428 S Shirlington Rd Arlington 979-1444  
**GLEBE RADIO APPLIANCES INC**  
5000 Lee Hwy Arlington 538-4444  
Hedges TV Sales & Service  
925 N Jackson St Arlington 525-7777

**HITACHI**  
AUTHORIZED DEALERS  
KOKOS-COLOR TV  
356 W Broad St Falls Church 534-4444

**HITACHI SALES & SERVICE**  
VIDEO WORKSHOP 3845 Plaza Dr Fairfax 534-4444  
Keith's TV Service 2853 Gallows Rd Falls Ch 534-4444  
KOKOS -COLOR TV  
356 W Broad St Falls Church (See Our Ad This Page)

**LANGLEY ELECTRONICS & CAMERA**  
• RCA • SONY • PANASONIC  
• RADIOS / WALKMANS / CAMCORDER  
• SERVICE ON MOST MAJOR BRANDS  
M-T-W-F 9-8 Thur Till 8  
Saturdays 9-5:30  
1364 Chain Bridge Rd McLean 761-1111

Luskens Inc 5150 Duke St Alexandria 261-1111  
11051 Lee Highway Fairfax 534-4444  
M S Enterprises 412 S Maple Av Falls Church 534-4444

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SUB

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NEW - USED - TV'S  
BUY - SELL - TRADE



**FAST HOME SERVICE**  
We Service All Makes  
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We Buy Used Sets  
We Sell Reconditioned Sets  
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USED TV SALES

**WE CARE**

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ANTRONICS COLOR  
TV SERVICE

**536-4441**

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AT 7200 LEE HWY  
FALLS CHURCH  
(NEAR 7-11)



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**mitsubishi**

**PIONEER**

**Panasonic**



**SONY**

**HITACHI**

**Canon**

- We Specialize in Large Screens-up to 70".
- Huge Display - To Make Your Choice Easy.
- Knowledgeable Sales Staff and Fast Delivery.

**BIG SCREENS**  
27"-35" BIG TUBES  
8"-20" TELEVISIONS

**VIDEO RECORDERS**  
VIDEO CAMERAS  
CAMERA RENTALS

(NEAR) **TYSONS CORNER**  
8455-D TYCO ROAD-VA.  
**FALLS CHURCH**  
356 WEST BROAD ST.-VA.

**OPEN SUNDAYS**

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**534-414**

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KOKOS-COLOR TV  
8455 D Tyco Rd Tysons Corner ..... 448-9739  
AUTHORIZED SALES & SERVICE  
VIDEO TECHNOLOGIES INC  
Toll Free ..... 800 523-8938

### MURRELL'S TELEVISION INC

2140 Wis Av ..... 202 338-7730  
(See Our Ad This Page)

### NURI'S TV & VIDEO CENTER

2840 Hartland Rd Falls Church ..... 560-0707  
(See Our Ad This Page)

### PALACE RADIO & TV INC

2907 Wilson Blvd Arlington ..... 522-9400

### PANASONIC

VIDEO WORKSHOP 3845 Plaza Dr Fairfax --- 385-8800

### PANASONIC TELEVISION & RADIO

AUTHORIZED DEALERS  
SHAFFER TV INC 233 Maple Av E Vienna --- 938-6577

Paul's Audio Video Center Co Stereo Man Inc  
8496-C Tyco Rd Vienna ..... 827-5797

Penney J C Co Inc  
112 N Washington St Alexandria ..... 549-7086

Power Video  
13027 Lee-Jackson Memorial Hwy Fairfax ..... 631-1114

PROFESSIONAL PRODUCTS INC  
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### PROVIDEO INC

1592 B Rockville Pike Rockville ..... 301 231-9800

PROVIDEO INC 2428 Wisconsin Av NW --- 202 333-9200  
(See Our Ad This Page)

### RCA TELEVISION

DEALERS  
SHAFFER TV INC 233 Maple Av E Vienna --- 938-6577

### SK TV & Electronics

7648 Richmond Hwy Alexandria ..... 768-3993

### SHAFFER TV INC

TV & VCR  
PANASONIC • SONY • RCA  
On Route 123 Next To Rite Aid Pharmacy  
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### Sheffield Electronics Inc

9535 Braddock Rd Fairfax ..... 323-9100

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Pages will serve you well  
24 hours a day the  
year round.

## TELEVISION & RADIO - DEALERS (Cont'd)

### SONY

#### DEALERS

KOKOS-COLOR TV  
8455-D Tyco Rd Tysons Corner ..... 448-9739  
LANGLEY ELECTRONICS & CAMERAS  
1364 Chain Bridge Rd McLean ..... 448-8990  
PALACE RADIO & TV INC  
2907 Wilson Blvd Arlington ..... 522-9400  
SHAFFER TV INC 233 Maple Av E Vienna --- 938-6577

### SONY SALES & SERVICE

PALACE RADIO & TV INC  
2907 Wilson Blvd Arlington ..... 522-9400  
VIDEO WORKSHOP 3845 Plaza Dr Fairfax --- 385-8800

### Springfield TV Sales & Service

6617 Backlick Rd Springfield ..... 451-1273

### SYLVANIA TELEVISION

#### DEALERS

NURI'S TV & VIDEO CENTER  
2840 Hartland Rd Falls Church ..... 560-0707

### TELE-FIX OF HERNDON

Corner Of Eiden & Spring  
695 Spring St Herndon ..... 471-7899

### THACKERS TV & AUDIO

See FH TV Service Inc  
THEATERVISION  
11431 Rockville Pike Rockville ..... 301 816-0300

### VIDEO TECHNOLOGIES INC

Industrial/Professional/Video Products Sales  
Service-Rentals  
8010 Staples Mill Rd ..... 804 262-0050

### VIDEO WORKSHOP

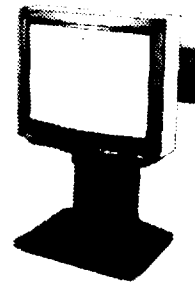
3845 Plaza Dr Fairfax ..... 385-8800  
(See Our Ad Next Page)

(Continued Next Page)

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business!

## "Washington's Largest Displaying Big Screen TV Dealer"

- Stereo Televisions Up to 35"
- Mitsubishi 70" TV ■ IDTV
- Big Screens Up To 20 Feet
- Super VHS Stereo Hi Fi VCRs
- Digital Audio Surround Receivers
- All Format Camcorders
- Factory Authorized Service
- Custom Installation
- Industrial Sales & Rentals



MITSUBISHI SONY NEC PHILIPS  
Canon PIONEER ANON Panasonic Pulsar



202  
333-9200



# ProVideo

Georgetown: 2428 Wisconsin Ave., N.W. 202-333-9200  
Rockville: 1592 Rockville Pike 301-231-9800



SYLVANIA  
& VIDEO CENTER

560-0707

2840 HARTLAND RD, FALLS CHURCH  
(MERRIFIELD)

FACTORY  
AUTHORIZED  
SALES & SERVICE



WE SELL & SERVICE  
VIDEO RECORDERS



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McLEAN • VIENNA • ARLINGTON

• FAIRFAX

★ Over 30 Years Experience In Electronics ★  
PROMPT HONEST RELIABLE SERVICE  
SPECIALISTS ON ALL AMERICAN & FOREIGN  
MULTISYSTEM TV'S & VCR'S

Qualified Service for



FREE PICK-UP  
& DELIVERY  
25 INCHES AND OVER  
WHEN WE REPAIR  
YOUR T.V.

MAKE YOUR YELLOW PAGES AD

# WORK HARDER

FOR YOU

#### Include:

1. A map to help shoppers find you fast.
2. The credit cards you accept.
3. Brand names you carry. They sell.
4. The special services you offer.
5. Business hours.
6. Your symbol or logo.
7. Delivery service.
8. Branch locations.



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Multi-System  
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Sales & Service Since 1956

DISCOUNT PRICING  
GREAT SELECTION

NEW USED

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Fast and  
Efficient:  
Deliveries &  
Service



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FACTORY AUTHORIZED  
**TV & VCR SALES & REPAIRS**  
**SONY** **Panasonic** **HITACHI**  
**WE REPAIR ALL MAKES & MODELS**

"We have the **LOWEST PRICES** in the area on our  
stock of **Color Tv's & VCR's**. Try Us!"

**VIDEO WORKSHOP LTD**

**385-8800**

3845 Plaza Drive Fairfax City, VA 22030

"Service You Can Depend On - Prices You Can Afford"



**FAIRFAX-VIENNA**  
**PAN-AM**  
**SHOPPING CTR**  
**TV - VCR**  
**SALES & SERVICE**

**ZENITH** **FREE** **HITACHI**  
IN SHOP T.V. ESTIMATES  
SERVICE ALL MAKES  
**FORT MYER TV**  
**573-6777**

**TELEVISION & RADIO -  
DEALERS (Cont'd)****ZENITH TELEVISION**

Zenith System 3...  
featuring Digital  
TV, Stereo TV and  
Projection TV.  
Also Zenith Video  
Cassette Recorders, Video Cameras and  
B&W TV. At Zenith, the quality goes  
in before the name goes on.



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2907 Wilson Blvd Arlington 522-4000

**TELEVISION & RADIO  
RENTING & LEASING**

Antronics Color TV Service  
800 S Washington St Falls Church 573-6777

**COLORTYME RENT TO OWN**

TV • VIDEO  
AUDIO • FURNITURE  
APPLIANCES  
• Rent By Phone  
• Free Delivery

**COLOR**

**COLORTYME TV**

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328 Amaret St Fredericksburg 573-6777

10338 Festival Ln Manassas 301-261-1111

COLORTYME TV 7706-D Richmond Hwy 703-281-1111

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"Get it today...  
the Magic Way"

**MAG**

• ORDER BY PHONE!  
• FAST DELIVERY!  
• FREE REPAIR SERVICE!  
• NO DEPOSIT or CREDIT CHECK!

"RENT TO OWN IN STYLE"

**MAGIC RENT TO OWN**

7810 Richmond Hwy Alexandria 301-261-1111

**National TV Rentals Inc**

4787 Marlboro Pk Alex - Alexandria Tel No-369-1111

**RENT-A-CENTER****OVER 1000 STORES  
COAST TO COAST**

Top quality, brand name appliances,  
electronics and furniture.

Rent by the day, week, month or to own. By

**FREE Set-Up • FREE Repair • FREE Loans**

**NO Credit Check/Deposit - NO Long Term Obligation**

**WHERE TO FIND US****RENT-A-CENTER**

7688 Richmond Hwy Alexandria 703-281-1111

2107 Mount Vernon Av Alexandria VA 541-1111

6112-M Arlington Blvd Fls Ctr 573-6777

**TELEVISION & RADIO  
SERVICE & REPAIR**

A - NOVA APPLIANCE SERVICE Alexandria 703-281-1111

(See Our Ad Page 1941)

ABC TV VIDEO SOUND TECHNOLOGY INC

8088 Rolling Rd Springfield 573-6777

(See Our Ad Next Page)

**A C TV-ANTRONICS**

TV - VCR - Sales & Service - Free Estimate

800 S Washington St Falls Church 573-6777

Ace Television & Radio Service

6119 Guilford Dr Alex 573-6777

**KEITH'S TV SERVICE**

ALL MAKES & MODELS

**FREE ESTIMATE**

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CERTIFIED ELECTRONICS TECHNICIAN

**573-1300**

MEERFIELD PLAZA SHOP CENTER  
LEE HIGHWAY & GALLOWES RD  
2863 GALLOWES RD FALLS CHURCH

PROJECTION TV's • VIDEO RECORDERS  
CAMCORDERS • MICROWAVES  
• PICK-UP & DELIVERY SERVICE AVAILABLE  
• WE TAKE TRADE-INS

MON-SAT 9:30-6:30

**Washington Electronics**

**NORTHERN VIRGINIA'S T.V. SERVICE HEADQUARTERS**

WARRANTY SERVICE CENTER  
FOR MOST MANUFACTURERS

AKAI	JVC	PANASONIC	SAMSUNG	SONY
AWA	KENWOOD	PIONEER	SANSUI	SOUNDDESIGN
EMERSON	MAGNAVOX	PHILLIPS	SANYO	SYLVANIA
FISHER	MARANTZ	PROTON	SCOTT	TEAC
GE	MITSUBISHI	QUASAR	SHARP	TECHNICS
GOLDSTAR	NEC	RCA	SHERWOOD	TOSHIBA
HITACHI				ZENITH

**FALLS CHURCH 533-9595**  
2860 PRINCE WILHEM DR  
FALLS CHURCH VA 22044

**CHANTILLY 378-9595**  
1424N GULLYFIELD CIR  
CHANTILLY VA 22031

The Most Satisfying Name in the Service  
For Over 20 Years in the  
Northern Va Area

**TELE-FIX INC.**

Located Corner of Spring St & Eldon  
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• Pick-up & Delivery • House Calls

SPECIALIZING IN

- PROJECTION TV'S
- CAMCORDER'S
- VIDEO

COMMERCIAL  
•  
RESIDENTIAL

## APPENDIX B



# REMOTE

# RCA

## Universal Remote Control

### THIS SYSTEMLINK™ 4+ REMOTE CONTROL IS COMPATIBLE WITH THE FOLLOWING BRANDS

(with infrared controlled components manufactured after 1984):

#### ■ CUSTOM TV:

Preset up to 10 of your favorite stations. Quickly access stations you watch most by pressing a number key.

#### ■ LIGHTED DEVICE KEYS:

Shows you what device is being operated ... even in the dark.

#### ■ CODE SEARCH:

Scans the entire code library to find the right code for your TV, VCR, or Cable Box at the touch of a button.

#### ■ CODE SAVER:

Holds a charge and saves your codes while you change batteries.

#### ■ TRANSMIT/LOW BATTERY WARNING LIGHTS:

The LED lights to show the remote is working and flashes when it's time to change batteries.

#### ■ TOLL-FREE CONSUMER HELPLINE:

A customer service representative is ready to help with questions. See the instruction book for details.

Requires Four (4) AAA Batteries (Not Included)

RCU400



0 79000 30244 5

### TV

Akai	Goldstar	MTC	Sears
Anam National	Hallmark	Multivision	Sharp
AOC	Hitachi	NAD	Sony
Candle	Infinity	NEC	Soundesign
Citizen	JBL	Panasonic	Sylvania
Colartyme	JCPenney	Philco	Symphonic
Concerto	Jensen	Philips	Tatung
Contec/Cony	JVC	Pioneer	Technics
Craig	Kawasho	Portland	Techwood
Curtis Mathes	Kenwood	ProScan	Teknika
CXC	Klass Novabeam	Proton	Telecaption
Daewoo	KTV	Quasar	TMK
Daytron	Loewe	Radio Shack	Toshiba
Electrohome	Luxman	RCA	Universal
Emerson	LXI	Realistic	Victor
Envision	Magnavox	Sampo	Vidtech
Fisher	Marantz	Samsung	Wards
Funai	MGA	Sanyo	Yamaha
GE	Mitsubishi	Scott	Zenith

### VCR

Aiwa	Harman	NEC	Shintom
Akai	Kardon	Panasonic	Sony
Audio Dynamics	Hitachi	Pentax	Sylvania
Broksonic	Instant Replay	Pentax-Research +	Symphonic
Candle	JCL	Philco	Tandy
Canon	JCPenney	Philips	Tashiko
Capehart	JVC/Victor	Pioneer	Tatung
Citizen	Kenwood	Portland	Teac
Colartyme	Lloyd	ProScan	Technics
Craig	Logic	Quartz	Teknika
Curtis-Mathes	Magnavox	Quasar	TMK
Daewoo	Marantz	Radio Shack	Toshiba
DBX	Marta	RCA	Totevision
Dimensia	MEI	Realistic	Unitech
Dynatech	Memorex	Samsung	Vector Research
Electrohome	MGA	Sansui	Victor
Emerson	Midland	Sanyo	Video Concepts
Fisher	Minolta	Scott	Videasonic
Funai	Mitsubishi	Sears	Wards
GE	MTC	Sharp	Yamaha
Goldstar	Multitech		Zenith

### CABLE BOX

ABC	Hitachi	RCA	Sylvania
Anvision	Jerrold	Randtek	Teknika
Cablestar	Macom	Regal	Texscan
Diamond	Magnavox	Regency	Tocom
Eagle	NSC	Samsung	Unika
Eastern Int.	Oak	Sci. Atlanta	Universal
General	Oak Sigma	Signature	Viewstar
Instruments	Panasonic	Sprucer	Warner Amex
GI 400	Philips	Starcom	Zenith
Hamlin	Pioneer	Stargate 2000	

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RCU400